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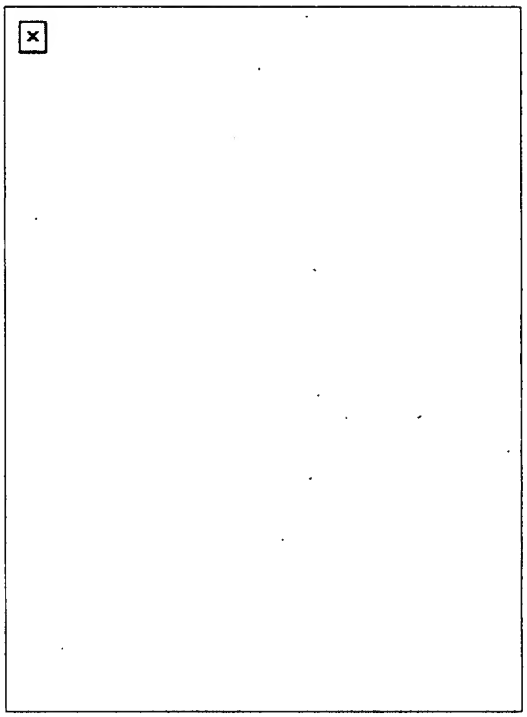
(54) METAL MASK AND MANUFACTURING METHOD OF THE SAME

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a metal mask and a manufacturing method of the same enabled to accurately form an organic electroluminescent medium of an organic electroluminescent display panel, with improved manufacturing efficiency.
SOLUTION: The metal mask with a plurality of perforated openings through which evaporated material from an evaporation source passes, is composed of a mask main body part surrounding each of perforated openings, and a peripheral part with the thickness bigger than that of the mask main body part.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the metal mask which uses especially for the vacuum evaporationo process of this manufacture approach the luminous layer (henceforth an organic luminous layer) which consists of a thin film of the organic compound ingredient which presents the electroluminescence (henceforth EL) which emits light by impregnation of a current about the manufacture approach of the organic electroluminescence display panel formed on the substrate as a predetermined pattern is also about two or more organic EL devices with which each was equipped, and its manufacture approach.
[0002]
[Description of the Prior Art] On a transparence substrate, the laminating of a transparent electrode, an organic electroluminescence medium, and the metal electrode is carried out one by one, and an organic EL device is constituted. For example, organic electroluminescence media are the medium of the medium of the three-tiered structure of the monolayer of an organic luminous layer or an organic electron hole transportation layer, an organic luminous layer, and an organic electron transport layer or an organic electron hole transportation layer, and organic luminous layer two-layer structure, a medium of the layered product which inserted the electron or the impregnation layer of an electron hole among these suitable layers further, etc.
[0003] The laminating of the line electrode containing a transparent electrode layer, an organic electroluminescence medium, and the train electrode containing the metal-electrode layer which intersects a line electrode is carried out one by one, and the thing of an organic electroluminescence display panel, for example, a matrix display type, is constituted. The line electrode is arranged so that predetermined spacing may be set and it may become parallel mutually, and its same is said of a train electrode while each is formed in band-like. Thus, the matrix display type display panel has the image display array which consists of a luminescence pixel of two or more organic EL devices formed in the crossing of the electrode of two or more row and columns.
[0004] In the production process of this organic electroluminescence display panel, an organic electroluminescence medium is formed after forming a transparent electrode layer on a transparence substrate. Although an organic electroluminescence medium is the thin film of one or more layers corresponding to a luminescence pixel, it is usually formed by the vacuum deposition using a metal mask. Usually, since the problem on which an organic EL device property deteriorates arises by the damage to the organic electroluminescence medium by invasion for the component of the solvent in a photoresist, the elevated-temperature ambient atmosphere in resist BEKU, permeation for the component of a resist developer or an etching reagent, and the plasma at the time of dry etching when using for an organic EL device the photolithography method used for patterning of a thin film, the vacuum deposition which used the metal mask is used.
[0005]
[Problem(s) to be Solved by the Invention] A detailed pattern cannot be formed according to the

alkoxy group having 1 to 30 carbon atoms which may have a substituent, an aryloxy group having 6 to 30 ring carbon atoms which may have a substituent, an alkylamino group having 3 to 30 carbon atoms which may have a substituent, an arylamino group having 6 to 30 carbon atoms which may have a substituent, an alkylsilyl group having 3 to 30 carbon atoms which may have a substituent, an arylsilyl group having 6 to 30 carbon atoms which may have a substituent or a carboxyl-containing group having 1 to 30 carbon atoms which may have a substituent)].

13. The transition metal complex compound having a metal carbene bond as described in any of claims 1 to 5, wherein M described above is Ir.

14. An organic electroluminescent device in which an organic thin film layer comprising a single layer or plural layers having at least a light emitting layer is interposed between an anode and a cathode, wherein at least one layer in the organic thin film layer contains the transition metal complex compound having a metal carbene bond as described in any of claims 1 to 5.

15. The organic electroluminescent device as described in claim 14, wherein the light emitting layer described above contains the transition metal complex compound having a

problem on which runs short of mask reinforcement and it bends a metal mask by the patterning approach by the vacuum evaporationo using a metal mask in being a pattern with a thin slit with large openings, such as a stripe-like pattern. It is difficult to form the pattern of a Rhine and a tooth space 300 micrometers or less from the rigid problem of a metal mask. Moreover, when it vapor-deposited using a metal mask with a thin tooth space, as shown in drawing 1 , the vacuum evaporationo matter was blocked by edge 27a of the tooth-space section of the metal mask 27, on the substrate 2, uniform vacuum evaporationo was not completed and problems, like a pattern shifts were.

[0006] This invention is made that such a problem should be solved, and the purpose of this invention is to offer the metal mask which uses manufacture effectiveness for the manufacture approach of the organic electroluminescence display panel which can improve, and there, and its manufacture approach while being able to perform exact formation of an organic electroluminescence medium etc.

[0007]

[Means for Solving the Problem] The metal mask of this invention is a metal mask which has two or more penetration openings, and is characterized by consisting of the periphery section which has the thickness it is thin size from the thickness of said body section of a mask located in the perimeter of the body section of a mask of each surroundings of two or more penetration openings, and said body section of a mask.

[0008] In the metal mask of this invention, said periphery section is characterized by having the level difference of a stairway configuration. In the metal mask of this invention, said body section of a mask of the circumference of said two or more penetration openings and each penetration opening is characterized by what was formed of etching. In the metal mask of this invention, said body section of a mask of the circumference of said two or more penetration openings and each penetration opening is characterized by what was formed of electrocasting.

[0009] The process which forms the 1st resist pattern which the metal mask manufacture approach of this invention is the manufacture approach of a metal mask of having two or more penetration openings, and has two or more penetration openings on a metal plate, The process which performs etching processing through said penetration opening of said 1st resist pattern, and forms two or more penetration openings in said metal plate, the 2nd resist pattern which has two or more 2nd penetration openings to which each makes the metal edge of the surrounding predetermined width of face of the process which removes said 1st resist pattern, and each of two or more of said penetration openings expose with the process formed on said metal plate Etching processing is performed through said 2nd penetration opening of said 2nd resist pattern. It is characterized by including the process which forms the periphery section which has the thickness it is thin size from the thickness of said body section of a mask located in the perimeter of the body section of a mask of each surroundings of said two or more penetration openings, and said body section of a mask, and the process which removes said 2nd resist pattern.

[0010] Moreover, the process which forms the 1st resist pattern which has two or more 1st penetration openings in which the metal mask manufacture approach of this invention is the manufacture approach of a metal mask of having two or more penetration openings, and each has the 1st area on the 1st page of a metal plate, each -- said 1st area -- smallness -- the 2nd resist pattern which has two or more 2nd penetration openings arranged in a location which has the 2nd area and is included in each of said 1st penetration opening Etching processing is performed through the process formed on the 2nd page of the opposite side of the 1st page of said metal plate, and said 1st and 2nd penetration opening of said 1st and 2nd resist patterns. The process which forms two or more 1st and 2nd crevices in said 1st [the] of said metal plate, and the 2nd page in the predetermined depth, respectively, The process which removes said 1st and 2nd resist patterns, said 1st area corresponding to [each is size from said 2nd area corresponding to said 2nd crevice, and] said 1st crevice -- smallness -- the 3rd resist pattern which has the 3rd area, and is made to expose a part of pars basilaris ossis occipitalis of said 1st crevice, and has the 3rd penetration opening of wrap plurality for the wall of said 1st crevice The process formed on the 1st page of said metal plate, and the process which forms the protective coat which protects said 2nd crevice on the 2nd page of said metal plate, Etching processing is performed through said 3rd penetration opening of said 3rd resist pattern. Two or more penetration openings which each penetrates from the pars

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03/06	187	08769062		8009	$160.00	$17,891.71
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basilaris ossis occipitalis of said 1st crevice to the pars basilaris ossis occipitalis of said 1st crevice are formed in said metal plate. It is characterized by including the process which forms the periphery section which has the thickness it is thin size from the thickness of said body section of a mask located in the perimeter of the body section of a mask of each surroundings of said penetration opening, and said body section of a mask, and has the level difference of a stairway configuration, and the process which removes said 2nd resist pattern and protective coat.

[0011] Furthermore, the process which forms the 1st resist pattern which the metal mask manufacture approach of this invention is the manufacture approach of a metal mask of having two or more penetration openings, and should be made two or more penetration openings on a conductive matrix plate, It is immersed into the solution containing the ion of the metal in the bath equipped with the anode plate for said matrix plate which has said 1st resist pattern. The process which forms the mask periphery section of the circumference of the body section of a mask which is made to electrodeposit said metal and consists of said metal of the surrounding predetermined width of face of each 1st resist pattern, and said body section of a mask on the part of said matrix plates other than said 1st resist pattern, The process which forms the 2nd resist pattern of a wrap according to an individual for said body section of a mask and 1st resist pattern, It is immersed into the solution containing the ion of the metal in the bath equipped with the anode plate for said matrix plate which has said 2nd resist pattern. It is characterized by including the process which forms the periphery section which has the thickness it is thin size from the thickness of said body section of a mask which is made to electrodeposit said metal and consists of said metal on said mask periphery section, and the process which removes said matrix plate and said 1st and 2nd resist patterns from said electrodeposited metal.

[0012]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained, referring to a drawing.

(Metal mask) Drawing 2 shows the metal mask 30 of an example of the gestalt of operation. This metal mask is a electrocasting metal mask for vacuum evaporationo, and has two or more penetration openings 31 for the vacuum evaporationo matter from the source of vacuum evaporationo to pass. This metal mask consists of periphery section 30b which has the thickness which it is thin from metals, such as nickel, and consists of thickness of the body section of a mask located in the perimeter of body section of mask 30a of each surroundings of two or more penetration openings 31, and the body section of a mask size. Periphery section 30b is formed so that it may have the level difference of a stairway configuration.

[0013] Two or more penetration openings of this metal mask are formed of etching. Moreover, with other gestalten, two or more penetration openings and the periphery section of a metal mask are formed of electrocasting. First, the manufacture approach which forms a metal mask by etching is explained. First, the plate of the metal plates 30, such as nickel of a material, is prepared, and as shown in drawing 3 , the 1st resist pattern 20 which has two or more penetration openings into the inside part except the periphery section of a metal plate 30 is formed on a metal plate.

[0014] Next, as shown in drawing 4 , etching processing is performed through penetration opening of the 1st resist pattern 20, and two or more penetration openings 31 are formed in a metal plate 30. next, as the 1st resist pattern is removed from a metal plate 30 and shown in drawing 5 , the 2nd resist pattern 21 which has two or more 2nd penetration openings to which each makes the metal edge of the surrounding predetermined width of face of each of two or more penetration openings 31 of a metal plate 30 expose is formed on a metal plate 30.

[0015] And as shown in drawing 6 , dry etching processing is performed through the 2nd penetration opening of the 2nd resist pattern 21, and periphery section 30b which has the thickness it is thin to body section of mask 30a of each surroundings of two or more penetration openings 31 size from the thickness of the body section of a mask located in the perimeter of the body section of a mask is formed to the predetermined depth so that it may have the level difference of a stairway configuration.

[0016] Next, as shown in drawing 7 , the 2nd resist pattern is removed. The interface of a metal which use the laminate of nickel and copper other than a single plate, and etching reagents are made to differ as

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a mask material, and is different can also be used as a level difference part. Furthermore, other manufacture approaches which form a metal mask by etching are explained. First, as shown in drawing 8 , the plate of the metal plate 30 of the three-layer laminating of the nickel (20-micrometer thickness)-copper (30-micrometer thickness)-nickel (20-micrometer thickness) of a material is prepared.
[0017] Next, as shown in drawing 9 , each forms the 1st resist pattern 23 which has two or more 1st penetration openings which have the 1st area A on the 1st page of a metal plate 30. the 2nd page top of the opposite side of the 1st page of a metal plate 30 -- each -- the 1st area A -- smallness -- the 2nd resist pattern 24 which has two or more 2nd penetration openings arranged in a location which has the 2nd area B and is included in each of the 1st penetration opening is formed.
[0018] Next, as shown in drawing 10 , etching processing is performed through the 1st and 2nd penetration opening of the 1st and 2nd resist patterns 23 and 24, and two or more 1st and 2nd crevices D1 and D2 are formed in the 1st of a metal plate, and the 2nd page in a predetermined depth of 20 micrometers, respectively. The etching reagent with which etching processing contains ferric chloride and a hydrochloric acid may be used. Next, as shown in drawing 11 , a metal plate is taken out from a treatment bath tub, and the 1st and 2nd resist patterns 23 and 24 are removed.
[0019] next, the 1st area A corresponding to [as shown in drawing 12 , each is size from the 2nd area B corresponding to the 2nd crevice to the 1st page top of a metal plate 30, and] the 1st crevice -- smallness -- the 3rd resist pattern 25 which has the 3rd area, and is made to expose a part of pars basilaris ossis occipitalis of the 1st crevice, and has the 3rd penetration opening of wrap plurality for the wall of the 1st crevice D1 is formed. The protective coat 26 which protects the 2nd crevice is formed on the 2nd page of a metal plate.
[0020] Next, as shown in drawing 13 , etching processing is performed through the 3rd penetration opening of the 3rd resist pattern, and two or more penetration openings 31 which each penetrates from the pars basilaris ossis occipitalis of the 1st crevice to the pars basilaris ossis occipitalis of the 1st crevice are formed in a metal plate 30. The etching reagent with which this etching processing contains phosphoric acid, a nitric acid, and an acetic acid may be used. Next, as shown in drawing 14 , periphery section 30b which takes out a metal plate from a treatment bath tub, removes the 2nd resist pattern and a protective coat, and has the thickness it is thin size from the thickness of the body section of a mask located in the perimeter of body section of mask 30a of each surroundings of penetration opening and the body section of a mask, and has two steps of level differences of a stairway configuration is formed.
[0021] Next, the manufacture approach which forms a metal mask by electrocasting is explained. First, a negative-mold photoresist layer is uniformly formed on the principal plane of the matrix plate 10 which consists of stainless steel, for example. Next, the latent image corresponding to predetermined penetration opening which irradiates light through a predetermined film mask and should be formed on a photoresist layer is formed in a matrix pattern. The exposed photoresist layer is developed and the pattern of two or more minute heights (henceforth a convex) of the photoresist 2 corresponding to opening which should be formed is prepared. Thus, the 1st resist pattern 20 which should be made two or more penetration openings as shown in drawing 15 is formed in the inside part except the periphery section on the conductive matrix plate 10.
[0022] Next, as shown in drawing 16 , the electrocasting tub 50 with anode plate 49 filled with the solution 51 containing nickel ion is prepared, the obtained stainless steel matrix plate 10 is dipped into this tub, and a direct current is passed between fixed time amount and anode plate cathode by using the matrix plate 10 as cathode. And as shown in drawing 17 , nickel (nickel) is electrodeposited on the stainless steel matrix plate 10 around a convex, a thick nickel layer is formed, and the matrix plate 10 is taken out from a tub after that. Thus, nickel is made to electrodeposit on the part of matrix plates other than a resist pattern. Thus, the metal mask 30 which consists of body section of mask 30a which consists of metal nickel of the surrounding predetermined width of face of the convex of the 1st resist pattern which consists of metal nickel, and mask periphery base 30c of the circumference of this body section of a mask is formed.
[0023] Next, as shown in drawing 18 , 2nd resist pattern of wrap 20b is formed according to an individual for body section of mask 30a, and the 1st resist pattern 20. Next, it is immersed into the

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10972632	DE	10/25/06	1633	AMSB	Amendment Submitted/Entered with Filing of CPA/RCE
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11008804	DE	10/25/06	1700	N/AP	Notice of Appeal Filed
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electrocasting solution 51 containing the ion of the metal in the bath 50 equipped with the anode plate 49 for the matrix plate 10 which has 2nd resist pattern 20b as shown in drawing 19 , and on mask periphery base 30c, metal nickel is made to electrodeposit further and periphery section 30b which has the thickness it is thin size from the thickness of the body section of a mask it is thin from nickel is formed.

[0024] As shown in drawing 20 , after that, the matrix plate 10 is taken out from a tub, and as shown in drawing 21 , the metal mask which is the nickel layer 30 is separated and removed from the stainless steel matrix plate 10, and it completes. In this invention, in order to manufacture a metal mask with electroforming (the depositing method), processing in the range of **1 micrometer where precision is higher than the board thickness of the metal mask by the method of etching from the conventional rolling plate also becomes possible, and board thickness precision is improved.

[0025] With the metal mask by the method of etching from the conventional rolling plate, although the probability of occurrence of a pinhole is high, in order to make by the depositing method, by this invention, generating of a pinhole becomes near in a metal mask 10 micrometers or more that there is nothing. With the technique of throwing power, also in a big area, it is smooth, and at electroforming, since there is no mediation of a segregation or an impurity and the metal of thickness regularity can moreover be finished [homogeneous], the functional quality of a metal mask is stabilized. The variation in the die length of the lengthwise direction of metal mask penetration opening and a longitudinal direction decreases, and the radius of curvature for the corner becomes small, and will become acute.

[0026] Furthermore, since the inclination of the side attachment wall of the base of a crevice and the radius of curvature of a corner can be controlled very small when the wall cross section of metal mask penetration opening takes a level difference, the precision of the pixel at the time of this vapor-depositing an organic electroluminescence medium and making it a display panel improves. The manufacture approach of the organic electroluminescence display panel using the obtained electrocasting metal mask is explained.

(The 1st display electrode Rhine formation) First, since a light-emitting part is demarcated at the intersection of the 1st and 2nd display electrode, the process which forms on a transparence substrate, two or more 1st display electrodes, i.e., anode plate, which each elongates horizontally, is explained.

[0027] The transparence substrates 2, such as glass, are prepared, and as shown in drawing 22 , two or more connected island-shape transparent electrode 3a which consists of ingredients of a high work function, such as an indium stannic acid ghost (henceforth ITO), is formed in the principal plane in the shape of a matrix so that it may become an image display array area. Next, as shown in drawing 23 , bus-line 3b of the metal which connects horizontally these island-shape transparent electrode 3a electrically is formed by vacuum evaporationo etc. Let width of face of a bus line be smallness rather than the width of face of an island-shape transparent electrode. 1st display electrode Rhine 3 which consists of this island-shape transparent electrode and bus line forms membranes in parallel mutually by two or more. the bus-line edge outside an image display array area -- the object for connection -- pad 3P can be formed. Furthermore, the pad for connection of the cathode formed behind can also be formed. In addition, the 1st display electrode Rhine top can also be covered with an insulator layer except for an island-shape transparent electrode and the bus line on it.

(Septum formation) Next, as shown in drawing 24 , the septum 7 of two or more electric insulation is formed so that it may elongate perpendicularly to the 1st display electrodes 3a and 3b and each may be located between island-shape transparent electrodes. Here, a septum ingredient is formed using technique, such as the usual photolithography method, using a photoresist. As for a septum 7, the cross section which consists of an over hang which projects in the direction parallel to a substrate has the configuration of the abbreviation mold for T characters or, and a back taper (reverse isosceles trapezoid) in the body of a septum, and its upper part. Thus, the septum by which some 1st display electrodes, especially a transparent electrode are made to expose at least, and the whole projects from a substrate is formed.

[0028] Edge 7a of a septum 7 is formed so that it may extend outside an image display array area for the 2nd display inter-electrode short circuit prevention formed later, and if the height from the substrate of a

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Employee Number: 66183 FROM PP: 2007-02 TO PP: 2007-02 Category: DE

Application	Entry Codes	Date Entered	Transaction Codes	Content Codes	Description
10471528	DE	10/25/06	1870	XT/G	Request for Extension of Time - Granted
10476175	DE	10/25/06	1630	A...	Response after Non-Final Action
10476813	DE	10/25/06	1327	RCEX	Request for Continued Examination (RCE)
10476813	DE	10/25/06	1870	XT/G	Request for Extension of Time - Granted
10476813	DE	10/25/06	1633	AMPR	RCE- AF Processed
10487174	DE	10/25/06	1631	A.NE	Amendment after Final Rejection
10489583	DE	10/25/06	1845	EIDS.	Electronic Information Disclosure Statement
10510300	DE	10/25/06	1630	A...	Response after Non-Final Action
10533654	DE	10/25/06	1630	A...	Response after Non-Final Action
10533654	DE	10/25/06	1845	EIDS.	Electronic Information Disclosure Statement
10533654	DE	10/25/06	1870	XT/G	Request for Extension of Time - Granted
10546450	DE	10/25/06	1844	M844	Information Disclosure Statement (IDS) Filed
10546450	DE	10/25/06	RCAP	RCAP	Reference capture on IDS
10555864	DE	10/25/06	1624	A.PE	Preliminary Amendment
10555864	DE	10/25/06	1844	M844	Information Disclosure Statement (IDS) Filed
10555864	DE	10/25/06	RCAP	RCAP	Reference capture on IDS
10555864	DE	10/25/06	1608	RQPR	Request for Foreign Priority (Priority Papers May Be Included)
10555864	DE	10/25/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
10619349	DE	10/25/06	1633	AMSB	Amendment Submitted/Entered with Filing of CPA/RCE
10619349	DE	10/25/06	1327	RCEX	Request for Continued Examination (RCE)
10629066	DE	10/25/06	1633	AMSB	Amendment Submitted/Entered with Filing of CPA/RCE
10629066	DE	10/25/06	1327	RCEX	Request for Continued Examination (RCE)
10637171	DE	10/25/06	1845	EIDS.	Electronic Information Disclosure Statement
10667456	DE	10/25/06	1327	RCEX	Request for Continued Examination (RCE)
10667456	DE	10/25/06	1870	XT/G	Request for Extension of Time - Granted
10667456	DE	10/25/06	1633	AMPR	RCE- AF Processed
10675367	DE	10/25/06	1633	AMSB	Amendment Submitted/Entered with Filing of CPA/RCE
10675367	DE	10/25/06	1327	RCEX	Request for Continued Examination (RCE)
10731881	DE	10/25/06	1844	M844	Information Disclosure Statement (IDS) Filed
10731881	DE	10/25/06	RCAP	RCAP	Reference capture on IDS
10765808	DE	10/25/06	1327	RCEX	Request for Continued Examination (RCE)
10765808	DE	10/25/06	1633	AMPR	RCE- AF Processed
10768607	DE	10/25/06	1631	A.NE	Amendment after Final Rejection
10835472	DE	10/25/06	1327	RCEX	Request for Continued Examination (RCE)

septum 7 is height which the cathode 9 of the 2nd display electrode formed behind and the 1st display electrode do not short-circuit electrically, it is good without limit.
(Luminous layer formation) next, some of each 1st display electrodes -- an organic electroluminescence medium is deposited upwards and the process which forms the thin film of two or more organic electroluminescence media of at least one layer is explained. The electron hole transportation layer of an organic electroluminescence medium is formed uniformly beforehand. Next, an organic luminous layer is formed and an electron transport layer can also be formed at this process. Furthermore, an electron or the impregnation layer of an electron hole can also be formed among these suitable stratum functionale.
[0029] As shown in drawing 25 , in membrane formation of an organic luminous layer, alignment of the penetration opening 31 of the metal mask 30 is carried out to the ITO electrode 3 exposed between septa 7, a metal mask is laid on a septum, and 1st organic electroluminescence (for example, red luminescence) medium 8a is formed in predetermined thickness using the vacuum evaporationo approach. Next, after shifting a metal mask and carrying out alignment, similarly, a metal mask is laid on a septum, and sequential membrane formation of the 2nd (for example, green luminescence) and the 3rd organic electroluminescence medium (for example, blue luminescence) is carried out at predetermined thickness. Thus, the luminous layer formation process which carries out sequential migration of the metal mask so that one opening may be arranged on the adjoining 1st display electrode from on [of one] the 1st display electrode is repeated successively. Thus, the thin film of an organic electroluminescence medium is formed of vacuum evaporationo using the same electrocasting metal mask. Two or more organic luminous layers which an organic electroluminescence medium is separately juxtaposed on the 1st display electrode, respectively, and emit light in the light of red and a green and blue predetermined color by electrical-potential-difference impression, respectively are formed.
[0030] if a metal mask is removed after forming the organic electroluminescence medium of three kinds of RGB in a predetermined part, as shown in drawing 26 , the organic electroluminescence medium 8 will appear on each of the transparent electrode part of exposed 1st display electrode Rhine.
(The 2nd display electrode formation) On the thin film of an organic electroluminescence medium, as shown in drawing 27 , the cathode of two or more 2nd display electrodes 9 elongated perpendicularly is formed, and a light-emitting part is demarcated in each intersection with the 1st display electrode.
[0031] The summit and over hang of a septum 7 serve as a roof and eaves to metallic-fumes flow, and since the metal membrane deposited on the summit of a septum 7 and the over hang is separated from the 2nd display electrode 9, they can prevent the short circuit between 2nd display electrode Rhine 9 with the thin film of the organic electroluminescence medium 8. Moreover, as 2nd display electrode Rhine 9 of two or more cathode by over-hang 7a of a septum is divided by the vertical incidence of metallic fumes, it insulates electrically and it is shown in drawing 28 instead of **** Since extent to which a metallic-fumes style turns around over-hang 7a of a septum is smaller than extent around which an organic electroluminescence medium ingredient particle style turns, the organic electroluminescence medium 8 does not produce short-circuit with a flash, cathode 9, and the ITO anode plate 3 from 2nd display electrode Rhine 9.
[0032] Thus, after forming the 2nd display electrode, it moisture-proof-processes, and closes and a full color organic electroluminescence display panel is obtained. Although the metal mask for vacuum evaporationo is used with this operation gestalt in the process which forms the thin film of an organic electroluminescence medium, a electrocasting metal mask is arranged between the sources of vacuum evaporationo, and you may make it form it by vacuum evaporationo near the transparence substrate in the process which forms the 1st or 2nd display electrode about at least one kind of membrane formation of the 1st or 2nd display electrodes, such as a metal or a transparent electrode.
[0033] As shown in drawing 29 , the organic electroluminescence display panel has image display array area 1a which consists of plurality of the luminescence pixel 1 which it is arranged in the shape of a matrix on a substrate 2, and each becomes from the light-emitting part of Red R, green G, and Blue B. A light-emitting part is formed on crossing partial transparent electrode 3a of 1st display electrode Rhine 3 and vertical 2nd display electrode Rhine 9. Although the above operation gestalt showed the metal mask used for vacuum evaporationo, this metal mask can be used in order to form the metal membrane in the

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Application	Entry Codes	Date Entered	Transaction Codes	Content Codes	Description
09973802	DE	10/25/06	1856	M856	Letter Requesting Suspension of Prosecution
10006876	DE	10/25/06	1631	A.NE	Amendment after Final Rejection
10152697	DE	10/25/06	1870	XT/G	Request for Extension of Time - Granted
10183251	DE	10/25/06	1633	AMSB	Amendment Submitted/Entered with Filing of CPA/RCE
10183251	DE	10/25/06	1327	RCEX	Request for Continued Examination (RCE)
10183251	DE	10/25/06	1870	XT/G	Request for Extension of Time - Granted
10232425	DE	10/25/06		C.AD	Correspondence Address Change
10232425	DE	10/25/06		PA..	Change in Power of Attorney (May Include Associate POA)
10232425	DE	10/25/06	1327	RCEX	Request for Continued Examination (RCE)
10232425	DE	10/25/06	1633	AMPR	RCE- AF Processed
10255364	DE	10/25/06	1650	AF/D	Affidavit(s) (Rule 131 or 132) or Exhibit(s) Received
10255364	DE	10/25/06	1633	AMSB	Amendment Submitted/Entered with Filing of CPA/RCE
10255364	DE	10/25/06	1327	RCEX	Request for Continued Examination (RCE)
10255364	DE	10/25/06	1870	XT/G	Request for Extension of Time - Granted
10294768	DE	10/25/06	1844	M844	Information Disclosure Statement (IDS) Filed
10294768	DE	10/25/06	RCAP	RCAP	Reference capture on IDS
10294768	DE	10/25/06	1327	RCEX	Request for Continued Examination (RCE)
10294768	DE	10/25/06	1870	XT/G	Request for Extension of Time - Granted
10294768	DE	10/25/06	1633	AMPR	RCE- AF Processed
10321356	DE	10/25/06	1700	N/AP	Notice of Appeal Filed
10323147	DE	10/25/06	1630	A...	Response after Non-Final Action
10331867	DE	10/25/06	1845	EIDS.	Electronic Information Disclosure Statement
10390905	DE	10/25/06	1327	RCEX	Request for Continued Examination (RCE)
10390905	DE	10/25/06	1870	XT/G	Request for Extension of Time - Granted
10390905	DE	10/25/06	1633	AMPR	RCE- AF Processed
10397582	DE	10/25/06	1856	M856	Letter Requesting Suspension of Prosecution
10397582	DE	10/25/06	1327	RCEX	Request for Continued Examination (RCE)
10397582	DE	10/25/06	1633	AMPR	RCE- AF Processed
10422357	DE	10/25/06	1844	M844	Information Disclosure Statement (IDS) Filed
10422357	DE	10/25/06	RCAP	RCAP	Reference capture on IDS
10449708	DE	10/25/06	1844	M844	Information Disclosure Statement (IDS) Filed
10449708	DE	10/25/06	RCAP	RCAP	Reference capture on IDS
10471528	DE	10/25/06	1633	AMSB	Amendment Submitted/Entered with Filing of CPA/RCE
10471528	DE	10/25/06	1327	RCEX	Request for Continued Examination (RCE)

membrane formation approaches, such as a spatter and CVD, a dielectric film, the transparence electric conduction film, etc. on monotonous.

[0034]

[Effect of the Invention] Since the metal mask which has two or more penetration openings which the vacuum evaporationo matter from the source of vacuum evaporationo passes consists of the periphery section which has the thickness it is thin size from the thickness of the body section of a mask located in the perimeter of the body section of a mask of each surroundings of two or more penetration openings, and this body section of a mask like the above according to this invention, the metal mask whose mechanical physical properties improved can be made.

[Translation done.]

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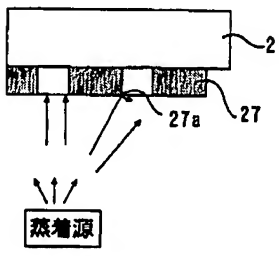
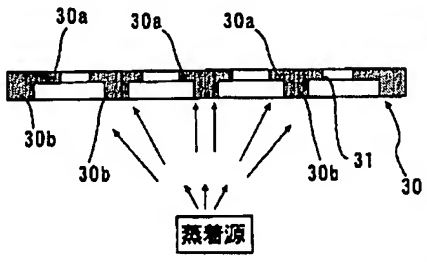
Application	Entry Codes	Date Entered	Transaction Codes	Content Codes	Description
11459909	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11476517	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11476517	DE	10/24/06	RCAP	RCAP	Reference capture on IDS
11476517	DE	10/24/06	1608	RQPR	Request for Foreign Priority (Priority Papers May Be Included)
11476517	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11480292	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11492139	DE	10/24/06	1624	A.PE	Preliminary Amendment
11492139	DE	10/24/06	1624	A.PE	Preliminary Amendment
11492139	DE	10/24/06	1604	C604	Substitute Specification Filed
11492139	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11496017	DE	10/24/06	1624	A.PE	Preliminary Amendment
11496017	DE	10/24/06	1624	A.PE	Preliminary Amendment
11496017	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11508833	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11508833	DE	10/24/06	RCAP	RCAP	Reference capture on IDS
11508833	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11526568	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11527520	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11527520	DE	10/24/06	1608	RQPR	Request for Foreign Priority (Priority Papers May Be Included)
11527520	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11528147	DE	10/24/06	1608	RQPR	Request for Foreign Priority (Priority Papers May Be Included)
11528147	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11528202	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11528326	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11528791	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11534497	DE	10/24/06	1624	A.PE	Preliminary Amendment
11534497	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11534497	DE	10/24/06	RCAP	RCAP	Reference capture on IDS
11534497	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11535532	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11535532	DE	10/24/06	RCAP	RCAP	Reference capture on IDS
11535532	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
09495141	DE	10/25/06	1700	N/AP	Notice of Appeal Filed
09495141	DE	10/25/06	1870	XT/G	Request for Extension of Time - Granted

における金属板の概略部分拡大断面図。
【図５】　本発明による実施例のメタルマスク製造工程における金属板の概略部分拡大断面図。
【図６】　本発明による実施例のメタルマスク製造工程における金属板の概略部分拡大断面図。
【図７】　本発明による実施例のメタルマスク製造工程における金属板の概略部分拡大断面図。
【図８】　本発明による他の実施例のメタルマスク製造工程における金属板の概略部分拡大断面図。
【図９】　本発明による他の実施例のメタルマスク製造工程における金属板の概略部分拡大断面図。
【図１０】　本発明による他の実施例のメタルマスク製造工程における金属板の概略部分拡大断面図。
【図１１】　本発明による他の実施例のメタルマスク製造工程における金属板の概略部分拡大断面図。
【図１２】　本発明による他の実施例のメタルマスク製造工程における金属板の概略部分拡大断面図。
【図１３】　本発明による他の実施例のメタルマスク製造工程における金属板の概略部分拡大断面図。
【図１４】　本発明による他の実施例のメタルマスク製造工程における金属板の概略部分拡大断面図。
【図１５】　本発明による実施例のメタルマスク製造工程における母型板の概略部分拡大断面図。
【図１６】　本発明による実施例のメタルマスク製造工程における母型板の概略部分拡大断面図。
【図１７】　本発明による実施例のメタルマスク製造工程における母型板の概略部分拡大断面図。
【図１８】　本発明による実施例のメタルマスク製造工程における母型板の概略部分拡大断面図。
【図１９】　本発明による実施例のメタルマスク製造工程における母型板の概略部分拡大断面図。
【図２０】　本発明による実施例のメタルマスク製造工程における母型板の概略部分拡大断面図。
【図２１】　本発明による実施例のメタルマスク製造工程における母型板の概略部分拡大断面図。
【図２２】　本発明による実施例の有機ＥＬ表示パネル製造工程における基板の概略部分斜視図。
【図２３】　本発明による実施例の有機ＥＬ表示パネル製造工程における基板の概略部分斜視図。
【図２４】　本発明による実施例の有機ＥＬ表示パネル製造工程における基板の概略部分斜視図。
【図２５】　本発明による実施例の有機ＥＬ表示パネル製造工程における基板の隔壁伸長方向に垂直な概略部分断面図。
【図２６】　本発明による実施例の有機ＥＬ表示パネル製造工程における基板の概略部分斜視図。
【図２７】　本発明による実施例の有機ＥＬ表示パネル製造工程における基板の概略部分断面図。
【図２８】　本発明による実施例の有機ＥＬ表示パネル製造工程における基板の隔壁伸長方向に垂直な概略部分断面図。
【図２９】　本発明による有機ＥＬ表示パネルの透明基板側からの概略部分拡大平面図。
【符号の説明】
１　発光画素
２　透明基板
３　第１表示電極ライン
３ａ　島状透明電極
３ｂ　バスライン
７　隔壁
７ａ　オーバーハング部
７ｂ　隔壁端部
８　有機ＥＬ媒体
９　第２表示電極ライン
３Ｐ　端子パッド
３０　メタルマスク

【図１】

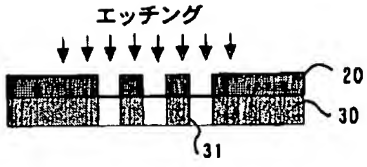


【図２】

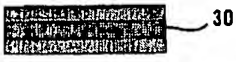


【図３】

【図４】



【図８】



【図１１】

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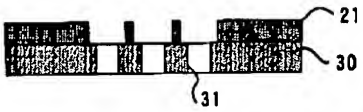
Employee Number: 66183 FROM PP: 2007-02 TO PP: 2007-02 Category: DE

Application	Entry Codes	Date Entered	Transaction Codes	Content Codes	Description
11246523	DE	10/24/06	RCAP	RCAP	Reference capture on IDS
11248532	DE	10/24/06	1631	A.NE	Amendment after Final Rejection
11249374	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11249919	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11256150	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11256390	DE	10/24/06	1630	ELC.	Response to Election / Restriction Filed
11291996	DE	10/24/06	1630	A...	Response after Non-Final Action
11293881	DE	10/24/06	1630	A...	Response after Non-Final Action
11304054	DE	10/24/06	1614	C614	New or Additional Drawing Filed
11304054	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11304054	DE	10/24/06	RCAP	RCAP	Reference capture on IDS
11305813	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11305813	DE	10/24/06	RCAP	RCAP	Reference capture on IDS
11312474	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11312474	DE	10/24/06	RCAP	RCAP	Reference capture on IDS
11315549	DE	10/24/06	1624	A.PE	Preliminary Amendment
11319634	DE	10/24/06	1630	A...	Response after Non-Final Action
11320238	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11335663	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11335663	DE	10/24/06	1608	RQPR	Request for Foreign Priority (Priority Papers May Be Included)
11335663	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11336823	DE	10/24/06	1630	A...	Response after Non-Final Action
11337895	DE	10/24/06	1630	A...	Response after Non-Final Action
11360641	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11360641	DE	10/24/06	RCAP	RCAP	Reference capture on IDS
11360641	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11367220	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11367220	DE	10/24/06	RCAP	RCAP	Reference capture on IDS
11375012	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11385515	DE	10/24/06	1624	A.PE	Preliminary Amendment
11385515	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11389048	DE	10/24/06	1630	A...	Response after Non-Final Action
11406589	DE	10/24/06	TSSC	TSSCOMP	IFW TSS Processing by Tech Center Complete
11454352	DE	10/24/06	1630	A...	Response after Non-Final Action

【図5】



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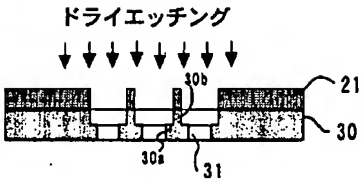

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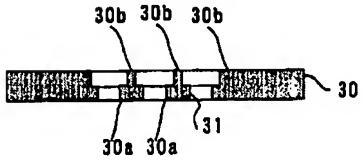

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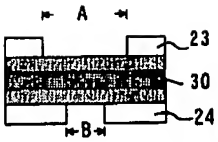

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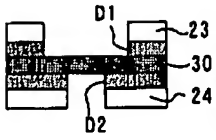

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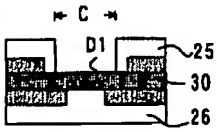

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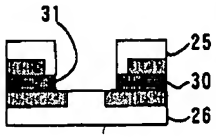

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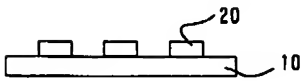

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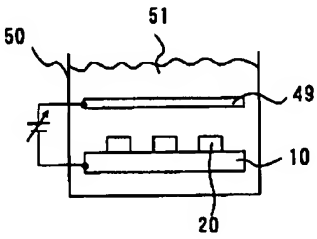

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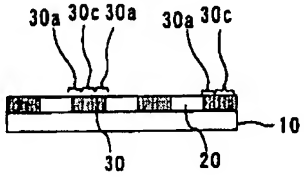

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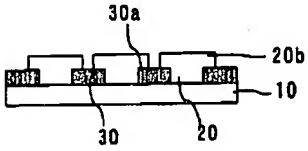

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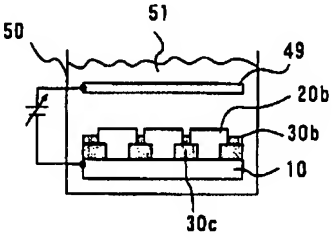

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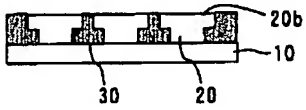

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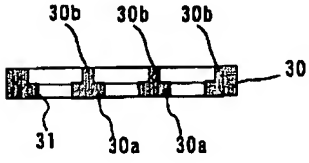

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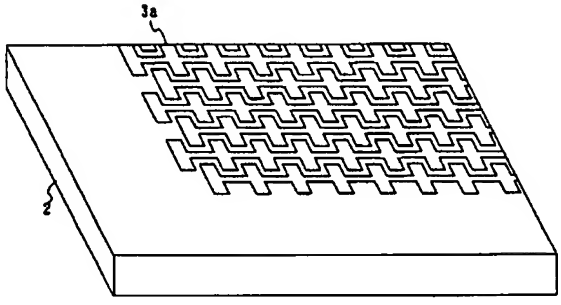

LIE ACTIVITY RECORD

Employee Number: 66183 FROM PP: 2007-02 TO PP: 2007-02 Category: DE

Application	Entry Codes	Date Entered	Transaction Codes	Content Codes	Description
11005377	DE	10/24/06	1845	EIDS.	Electronic Information Disclosure Statement
11008483	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11008483	DE	10/24/06	RCAP	RCAP	Reference capture on IDS
11009332	DE	10/24/06	1630	A...	Response after Non-Final Action
11009332	DE	10/24/06	1870	XT/G	Request for Extension of Time - Granted
11009963	DE	10/24/06	1630	A...	Response after Non-Final Action
11009963	DE	10/24/06	1632	A.I.	Informal or Non-Responsive Amendment after Examiner Action
11009963	DE	10/24/06	1870	XT/G	Request for Extension of Time - Granted
11010744	DE	10/24/06	1631	A.NE	Amendment after Final Rejection
11010744	DE	10/24/06	1870	XT/G	Request for Extension of Time - Granted
11013788	DE	10/24/06	1630	ELC.	Response to Election / Restriction Filed
11016990	DE	10/24/06	1630	ELC.	Response to Election / Restriction Filed
11017030	DE	10/24/06	1870	XT/G	Request for Extension of Time - Granted
11017451	DE	10/24/06	1845	EIDS.	Electronic Information Disclosure Statement
11039081	DE	10/24/06	1630	A...	Response after Non-Final Action
11058879	DE	10/24/06	1633	AMSB	Amendment Submitted/Entered with Filing of CPA/RCE
11058879	DE	10/24/06	1327	RCEX	Request for Continued Examination (RCE)
11058879	DE	10/24/06	1870	XT/G	Request for Extension of Time - Granted
11059541	DE	10/24/06	1630	A...	Response after Non-Final Action
11059541	DE	10/24/06	1614	C614	New or Additional Drawing Filed
11082974	DE	10/24/06		C.AD	Correspondence Address Change
11082974	DE	10/24/06		PA..	Change in Power of Attorney (May Include Associate POA)
11095913	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11095913	DE	10/24/06	RCAP	RCAP	Reference capture on IDS
11103528	DE	10/24/06	1630	A...	Response after Non-Final Action
11103589	DE	10/24/06	1327	RCEX	Request for Continued Examination (RCE)
11103589	DE	10/24/06	1870	XT/G	Request for Extension of Time - Granted
11103589	DE	10/24/06	1633	AMPR	RCE- AF Processed
11139887	DE	10/24/06	1631	A.NE	Amendment after Final Rejection
11151084	DE	10/24/06	1864	LET.	Miscellaneous Incoming Letter
11240023	DE	10/24/06	1630	A...	Response after Non-Final Action
11245232	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed
11245232	DE	10/24/06	RCAP	RCAP	Reference capture on IDS
11246523	DE	10/24/06	1844	M844	Information Disclosure Statement (IDS) Filed

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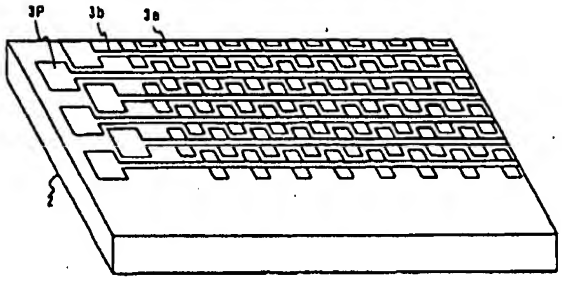

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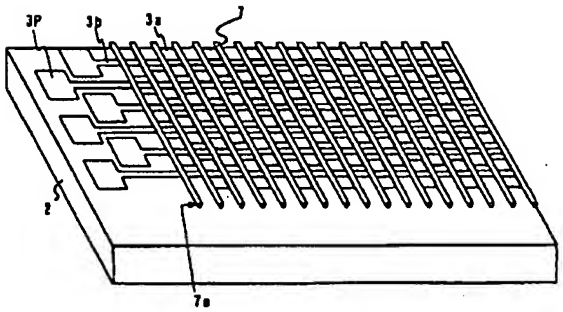

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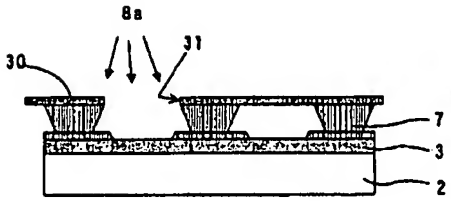

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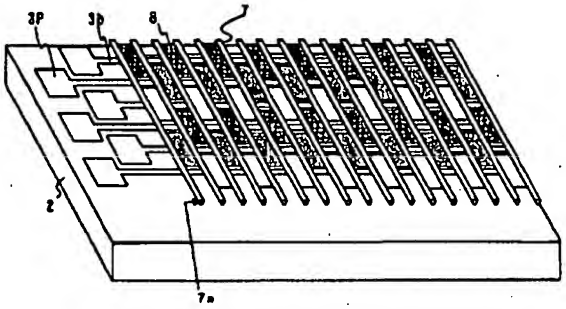

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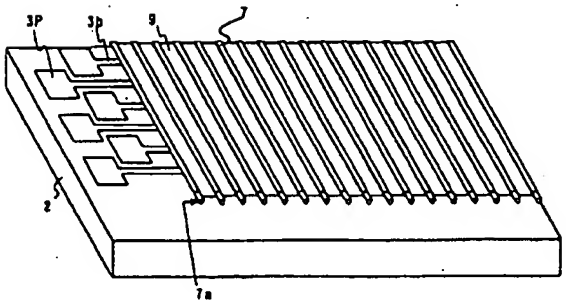

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